



Temperature, temperature extremes, and mortality: A study of acclimatization and effect modification in 50 United States cities

Author(s): Medina-Ramon M, Schwartz J
Year: 2007
Journal: Occupational and Environmental Medicine. 64: 827-833

Abstract:

OBJECTIVES: We examined the increase in mortality associated to hot and cold temperature in different locations, the determinants of the variability in effect estimates, and its implications for adaptation. **METHODS:** We conducted a case-crossover study in 50 US cities. We used daily mortality and weather data for 6,513,330 deaths occurring during 1989-2000. Exposure was assessed using two approaches. First, we determined exposure to extreme temperatures using city-specific indicator variables based on the local temperature distribution. Secondly, we used piecewise linear variables to assess exposure to temperature on a continuous scale above/below a threshold. Effects of hot and cold temperature were examined in season-specific models. In a meta-analysis of the city-specific results, we examined several city characteristics as effect modifiers. **RESULTS:** we found mortality increases associated to both extreme cold (2-day cumulative increase 1.59% (95% confidence interval: 0.56, 2.63)) and extreme heat (5.74% (3.38, 8.15)), the former being especially marked for myocardial infarction and cardiac arrest deaths. The increase in mortality was less marked at less extreme temperatures. The effect of extreme cold (defined as a percentile) was homogeneous across cities with different climates, suggesting that only the unusualness of the cold temperature (and not its absolute value) had a substantial impact on mortality (i.e., acclimatization to cold). Conversely, heat effects were quite heterogeneous, with the largest effects observed in cities with milder summers, less air conditioning and higher population density. Adjustment for ozone led to similar results, but some residual confounding could be present due to other uncontrolled pollutants. **CONCLUSIONS:** we confirmed in a large sample of cities that both cold and hot temperatures increase the mortality risk. Our findings suggest that increases in heat-related mortality due to global warming are unlikely to be compensated for by decreases in cold-related mortality and that population acclimatization to heat is still incomplete.

Source: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2095353>

Resource Description

Exposure : ☒

weather or climate related pathway by which climate change affects health

Air Pollution, Temperature

Air Pollution: Ozone

Temperature: Extreme Cold, Extreme Heat, Fluctuations

Climate Change and Human Health Literature Portal

Geographic Feature:

resource focuses on specific type of geography

Urban

Geographic Location:

resource focuses on specific location

United States

Health Impact:

specification of health effect or disease related to climate change exposure

Cardiovascular Effect, Morbidity/Mortality

Cardiovascular Effect: Heart Attack

Resource Type:

format or standard characteristic of resource

Research Article

Timescale:

time period studied

Time Scale Unspecified